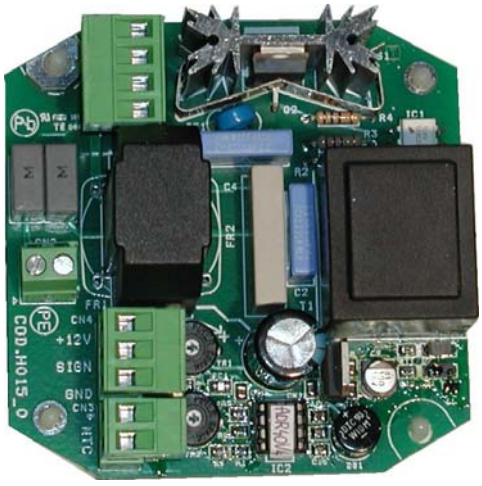
SPEED REGULATORS
FOR ASYNCHRONOUS SINGLE PHASE MOTORS

SERIES ADR 40



ADR 40

ADR 40 PP

Control by pressure or temperature

Pressure control 0-50 bar – for all refrigerants
Temperature control -20 to +100 °C

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SPECIFICATION REGULATOR ADR 40

INTRODUCTION

This regulator allows the control of fans, connected to single phase motors by 50/60 Hz, trough an algorithm which decides the fan speed on the base of a set of parameters adjusted by a trimmer on the border of the board and a pressure or temperature measure, executed in real-time by the board.

The board schedules to work with temperature sensor NTC 10 kOhm or with pressure sensor 4-20 mA.
The temperature sensor will be connected to the connector CN3 which is related to the inscription NTC.
The pressure sensor will be connected to the connector CN4 which is related to the inscriptions +12V, SIGN, GND.
The fan will be connected to the connector CN1 on the level with the inscription VENT.
The power supply 220Vac (50-60) Hz will be connected to the connector CN1 on the level with inscription N L

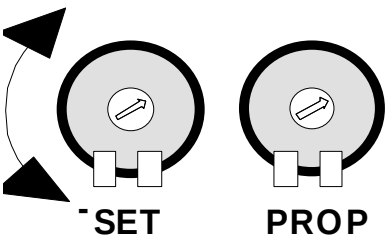
SYSTEM COMPOSITION

Input	Output
Temperature probe 10k @ 25°	Output for fan command 220 VAC 50/50Hz
Pressure probe (4÷20) ma	Output for fan command 220 VAC 50/50Hz

REGULATION PARAMETERS

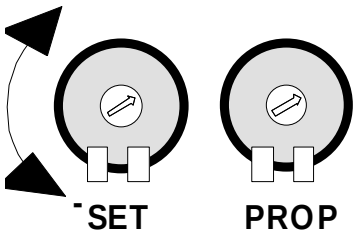
REGULATION

SET REGULATION	Indication and progress of the regulation
- Through the trimmer on the board close to the inscription SET also during the regulator working.	Progress ideal point (°C) if the working is in temperature. Progress ideal point (bar) if the working is in pressure.



PROPORTIONAL BAND REGULATION (PROP)

PROPORTIONAL BAND REGULATION PROP	Indication and progress of the regulation
- Through the trimmer on the board closet the inscription SET also when the regulator is working. .	Determining the extension of the proportional band, which is the regulation between MIN and MAX voltage. Determining a small/high band extension means a higher/smaller (faste/slower) variation of the ventilation speed for the same input signal



WORKING IN TEMPERATURE

The choice of the working in TEMPERATURE expects the use of a temperature sensor, type NTC10K.

To connector CN1, signed with the inscription VENT, connect a single phase motor 230 VAC 50/60Hz
To connector CN1, signed with the inscription N L, connect the power supply 230 Vac.
The connector CN4 for the input in current, signed with the inscriptions (+12V, SIGN, GND), is not connected.

For working in temperature it is necessary to connect the NTC probe and CN3 rim board which is related to the inscription NTC;
By adjusting the trimmer of SET and of the PROP is possible to modify the working characteristics See in fig 1,2,3 some examples.
The board calculates the fan speed, in relation to the temperature and based of the working characteristic determined by the values of the SET and PROP trimmer.

WORKING IN PRESSION

The choice of the working in PRESSION is dedicated to the control of the refrigeration pressure circuits for condensation and evaporation.

The choice of the working in PRESSION expects the use of pressure transducers type 4 - 20 mA
To connector CN1, signed with the inscription VENT, connect single phase motor 230VAC 50/60Hz.
To connector CN1, signed with the inscription N L, connect the power supply 220VAC.
For the working in pressure is necessary to connect the pressure sensor to the connector CN4 on the board signed with the inscription (+12V, SIGN, GND)

By adjusting the trimmer SET and PROP it is possible to modify the characteristics of working characteristics . See in fig 1,2,3 some examples.

The board calculates the fan speed, in relation to the pressure and based of the working characteristic determined by the values of the SET and PROP trimmer.

The working in pressure can also be affected by the temperature. Simply connect also the NTC sensor to connector CN1 signed wit NTC.
The intervention of the NTC sensor determines to switch off the fan after 20sec when the temperature noticed by the sensor exceeds 90°C. The fan is switched on again to pressure controlled working only when the temperature gets down below 90°C.

NORMAL WORKING SCHEME

This regulator allows the control of a fan, through an algorithm which decides the fan speed on the base of temperature or pressure compiled through the temperature or pressure sensor connected to the board.

The fan speed is controlled by the use of a temperature sensor NTC which senses the temperature and operates the fan like described in the graphics below.

Operation is very much related and influenced by the values of SET and PROP trimmer and result in a lot of working settings; some examples are noticed below.

The schematic diagrams below shows of change and influence in the different settings by the trimmer SET and Prop.
The abscissa is drawn for the temperature or the pressure and in ordinate there's the voltage percentage provided to the fan. The graphic can be separated in 3 sectors.

- **Sector (A):**
  Temperature / pressure under °***C/bar min*** => Voltage to the fan is Zero

- **Sector (B):**
  Temperature / pressure between °***C/bar min*** and **°C/bar max** => Voltage increases linearly between the minimum (**MIN**) and the maximum (**MAX)**

- **Sector(C):**
  Temperature/ pressure greater than **°C/bar max** => Maximimum voltage (**MAX**) is supplied to the fan.

NB.: The range of sector (B) to sector (C) includes a hysteresis avoiding, annoying hunting's between the working speeds. The same will be also for the range between sector (A) and sector (B) .
NB: Each fan start is begins with a short starting phase in which the speed is set to 70% of the total speed. After this short period it runs down to the equivalent speed according to the temperature or pressure signal.

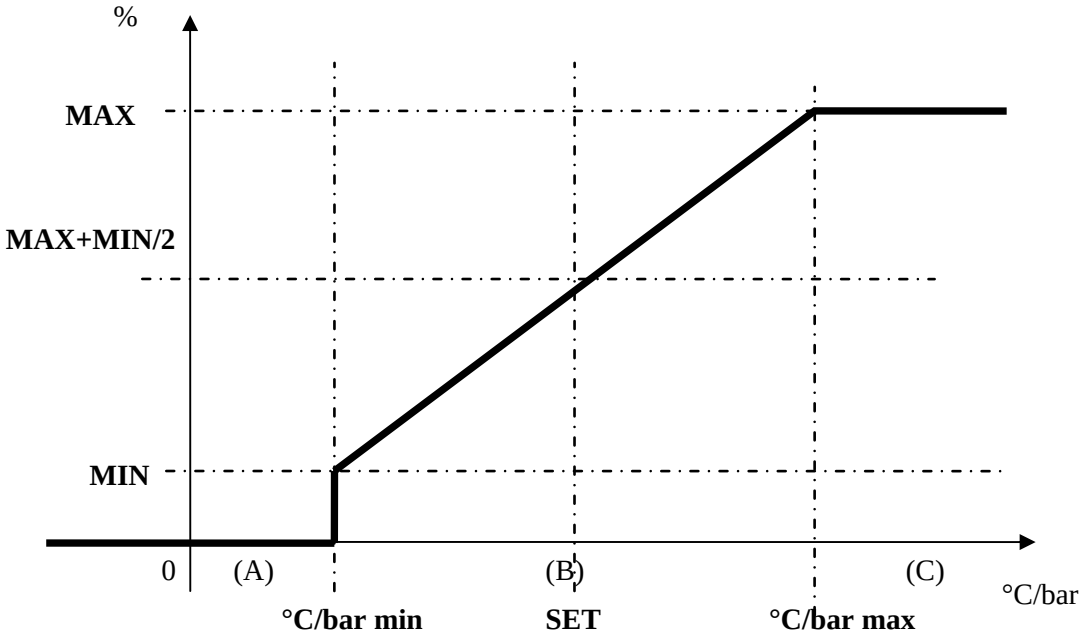

%
MAX
MAX+MIN/2
MIN
0
(A)
(B)
(C)
°C/bar
°C/bar min
SET
°C/bar max

Fig. 1

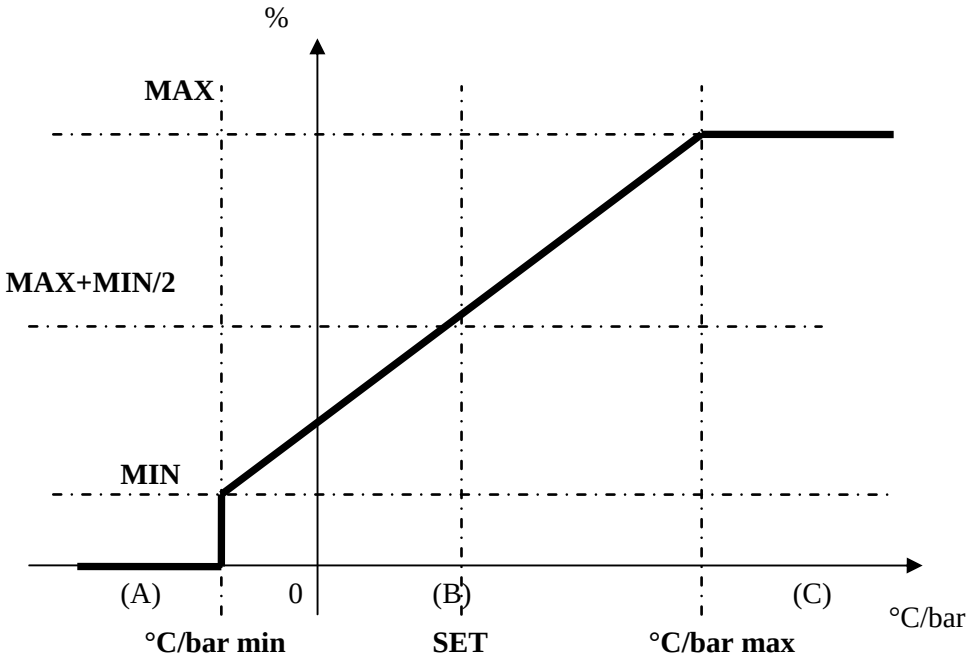

%
MAX
MAX+MIN/2
MIN
(A)
0
(B)
(C)
°C/bar
°C/bar min
SET
°C/bar max

Fig.2

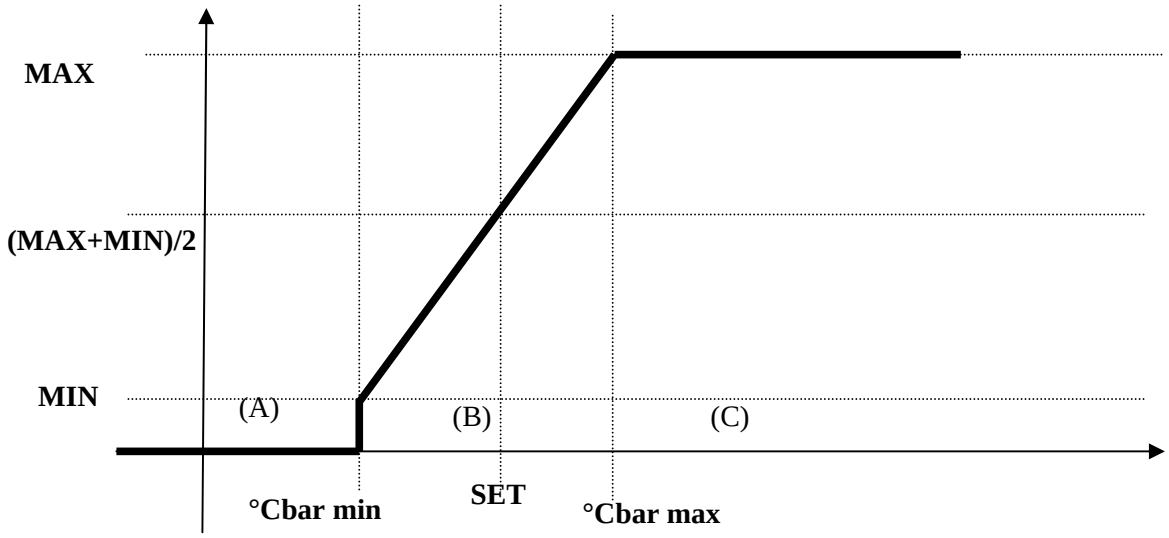


Fig 3

HEAT PUMP WORKING

It's possible to set the ADR 40 also to work in **heat pump function.** In that case the board works only with the pressure sensor 4-20 mA. This function can be used also in evaporating. To select this function it's sufficient to short-circuit the entry (connector CN3) "NTC".
In this case the normal function will be reversed as you will see in the following examples:

The fan speed is controlled by a pressure sensor which senses the pressure and operates on the fan like described in the graphics below.

Operation is very much related and influenced by the values of SET and PROP trimmer and result in a lot of working settings; some examples are noticed below.

The schematic diagrams below shows of change and influence in the different settings by the trimmer SET and Prop.
The abscissa is drawn for the temperature or the pressure and in ordinate there's the voltage percentage provided to the fan. The graphic can be separated in 3 sectors.

- **Sector (A):**
  *Pressure under **bar min*** => Maximum voltage (**MAX**) provided to the fan

- **Sector(B):**
  *Pressure between **bar min*** and **bar max** => Voltage that increases linearly between the minimum (**MIN**) and the maximum (**MAX)**

- **Sector (C):**
  Pressure greater of **°C/bar max** => Voltage to the fan is ZERO

NB.: The range of sector (B) to sector (C) includes a hysteresis avoiding, annoying hunting's between the working speeds. The same occurs also for the range between sector (A) and sector (B) .

NB: Each fan start is begins with a short starting phase in which the speed is set to 70% of the total speed. After this short period it runs down to the equivalent speed according to the temperature or pressure signal.

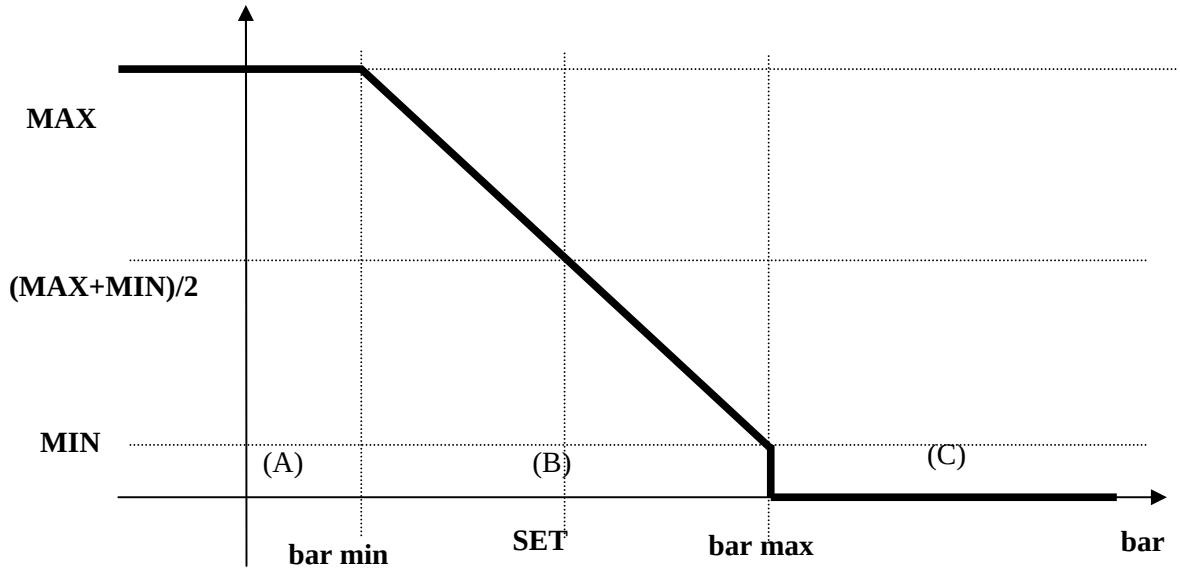


Fig 1

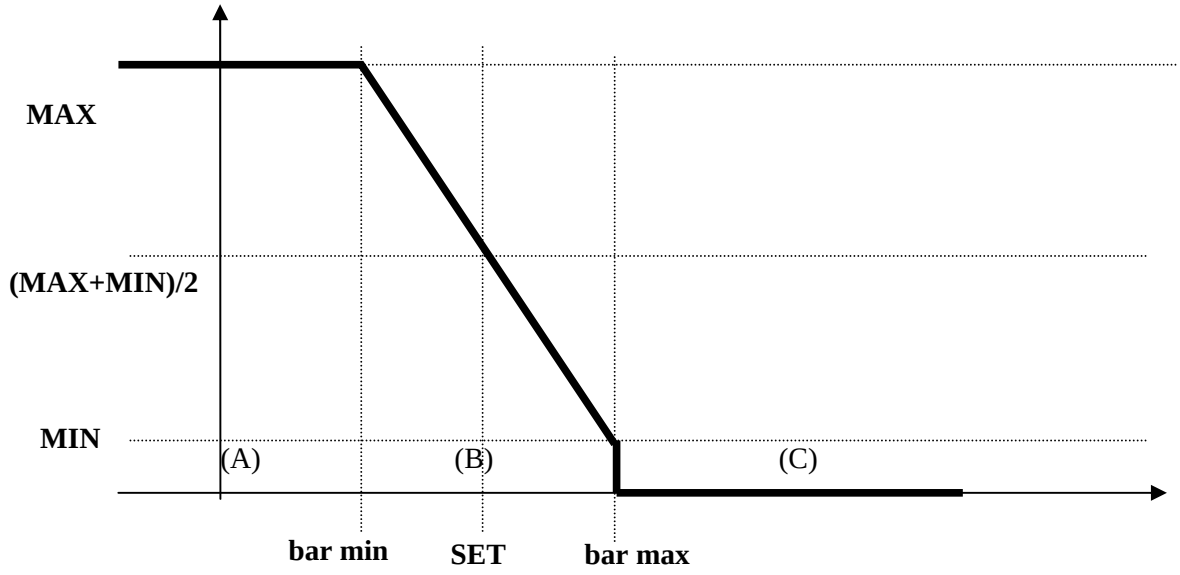


Fig 2

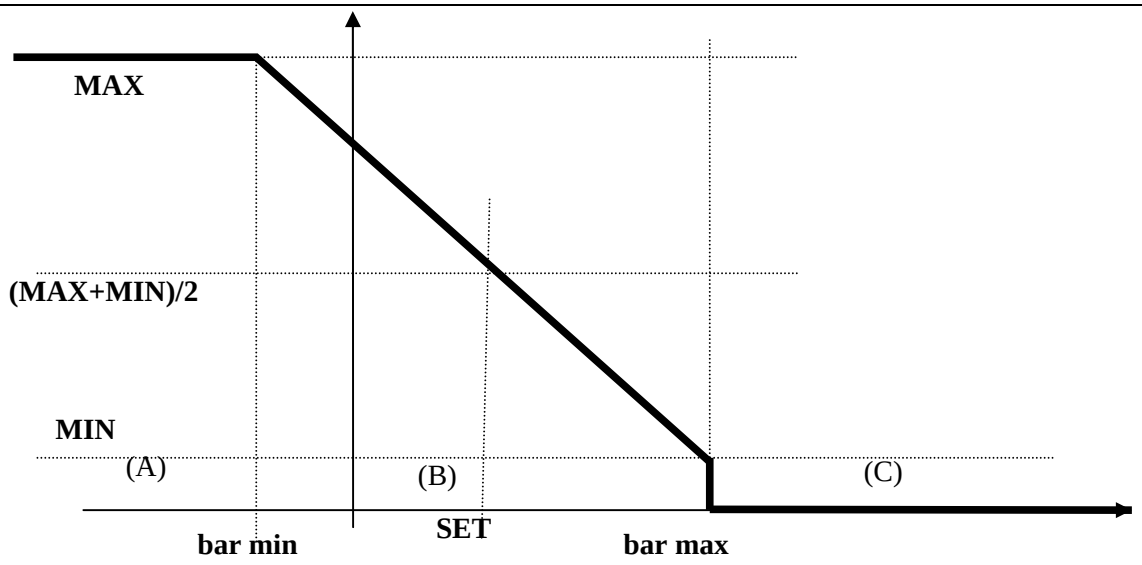


Fig 3

CONNECTIONS

The connectors

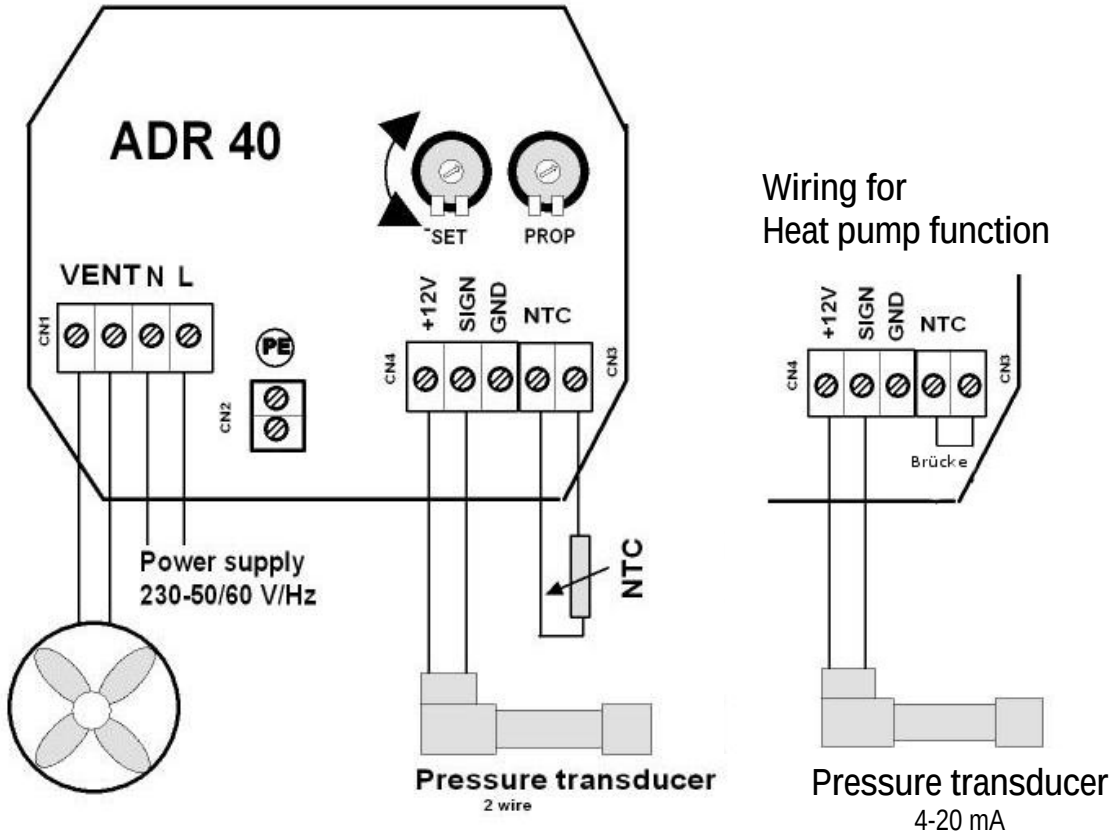
Con.	No. pin	Label	Description	Signal type
CN1	1	N	Power supply input (NEUTRAL)	230 VAC (80 –260 V) 50/60 Hz
	2	L	Power supply input (PHASE)	230 VAC (80 – 260 V) 50/60 Hz
	3	FAN	FAN output	230 VAC, max. 4 amps
	4	FAN	FAN output	230VAC max. 4 amps

Con.	No. pin	Label	Description	Signal type
CN4	1	+12V	Sensor Input	12V
	2	SIGN	Sensor output signal	mA
	3	GND	Negative	GND

Con.	No. pin	Label	Description	Signal type
CN3	1	NTC	NTC temperature sensor Input	mV/mA
	2	NTC	NTC temperature sensor Input	mV/mA

Con.	No. pin	Label	Description	Signal type
CN2	1	PE	System input (EARTHED)	230 VAC (180-260V) 50/60 Hz
	2	PE	System input (EARTHED)	230 VAC (180-260V) 50/60 Hz

Connection scheme of ADR 40

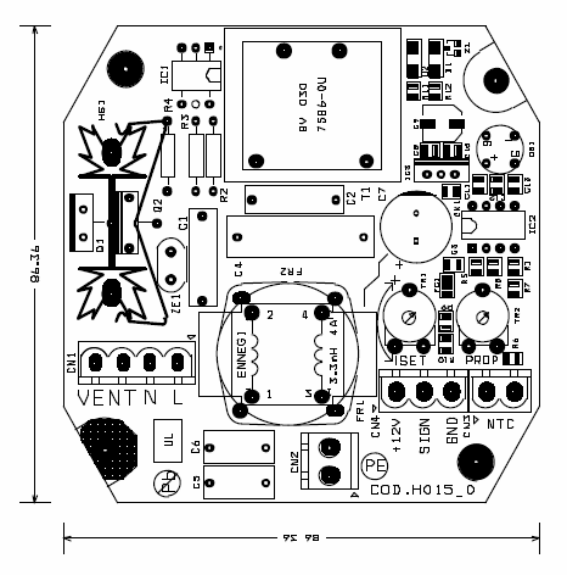


The scheme above shows the connection of a pressure transducer and alternatively the connection with a NTC sensor.
By using a 3-wire pressure transducer the transducer has to be wired to GND, too

Broken sensor connections

In case of an interruption of a pressure transducer or temperature sensor the ADR 40 manages to run the connected fans even at about 70% of max speed. (Safe to fail)

Dimension ADR 40 Board



Dimension ADR 40 DP – IP 54